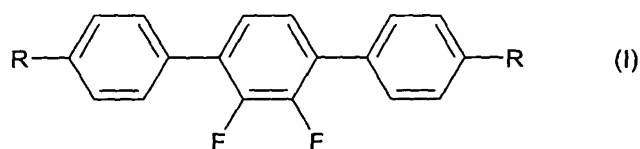


Patent Claims

1. A liquid-crystalline medium having a dielectric anisotropy $\Delta\epsilon$ of ≥ 3 , comprising compounds of formula (I)



10
in which

R, independently of one another, are each an alkyl, alkoxy or alkenyl radical having 1-15 or 2-15 carbon atoms respectively, in which one or more CH_2 groups may be replaced by -O- in such a way that oxygen atoms are not adjacent.

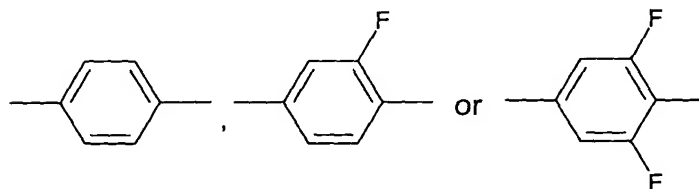
2. A liquid-crystalline medium according to Claim 1, comprising:

- a) 1 to 50% by weight of one or more compounds of formula (I);
- b) 5 to 90% by weight of one or more compounds of formulae (II) to (V)



in which

30
a, b and c, independently of one another, can be



- 28 -

R is an alkyl, alkoxy or alkenyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively, in which one or more CH₂ groups may be replaced by -O- in such a way that oxygen atoms are not adjacent,

5

X is -F, -OCF₃, -OCF₂H, -Cl or -CF₃, and

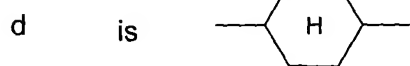
Z is a single bond or -CH₂-CH₂-;

10

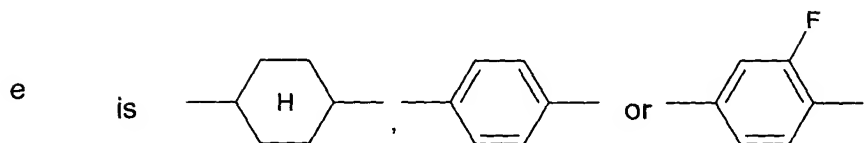


in which

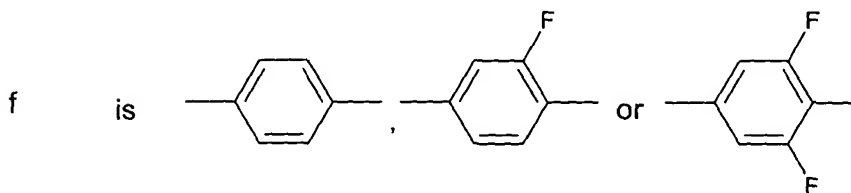
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and X and R are as defined above;

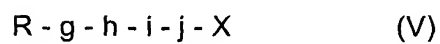
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in which

e, f, R and X are as defined above;

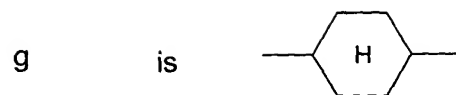
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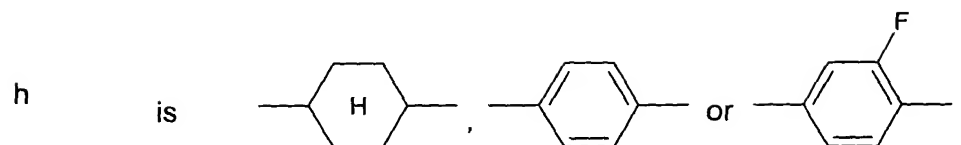
- 29 -

in which

5

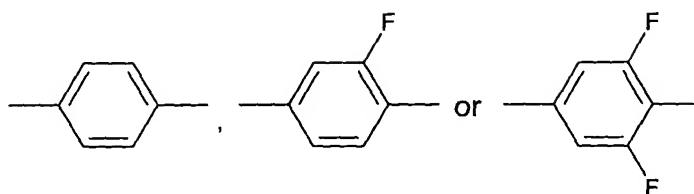


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i and j are each independently

15

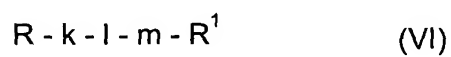


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and R and X are as defined above;

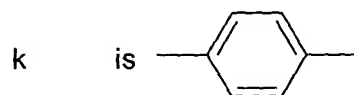
c) 0 to 30% by weight of one or more compounds of formula (VI)

25



in which

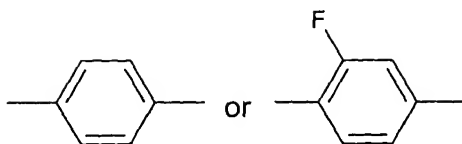
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l and m, independently of one another, can be

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- 30 -



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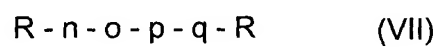
R is as defined above, and

10

R^1 , is -F, -Cl, or an alkyl, alkoxy or alkenyl radical having 1-15 or 2-15 carbon atoms respectively, in which one or more CH_2 groups may be replaced by -O- in such a way that oxygen atoms are not adjacent;

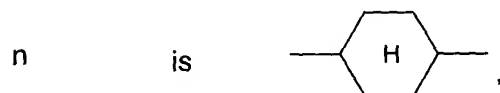
d) 0 to 30% by weight of one or more compounds of formula (VII)

15



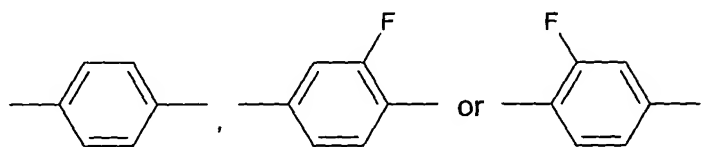
in which

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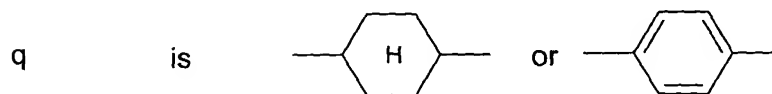


o and p are each independently

25



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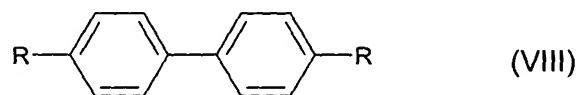
and

35

R are independent of one another and are as defined above; and

- e) 0 to 40% by weight of one or more compounds of formulae (VIII), (IX) and/or (X)

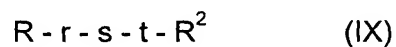
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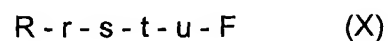
in which

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R are independent of one another and are as defined above,

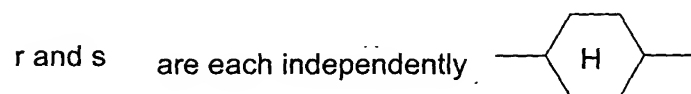


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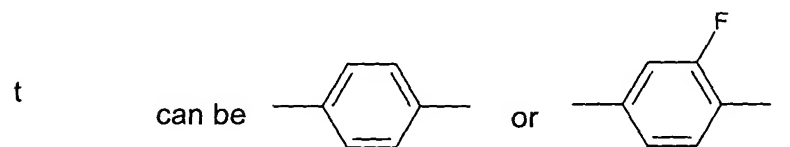


in which

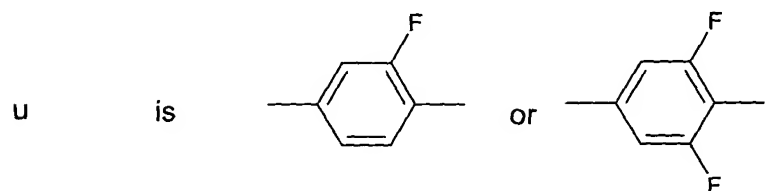
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R is as defined above, and

35

R^2 , is -F or an alkyl, alkoxy or alkenyl radical having 1-15 or 2-15 carbon atoms respectively, in which one or

more CH₂ groups may be replaced by -O- in such a way that oxygen atoms are not adjacent;

5 where the sum of components a) to e) is 100% by weight.

3. A liquid-crystalline medium according to Claim 1 or 2, wherein compounds of formula (II) are selected from the following compounds of (IIa) to (IIg)

10

R - P - G - U - X (IIa)

R - P - G - G - X (IIb)

R - G - G - G - X (IIc)

R - G - G - U - X (IId)

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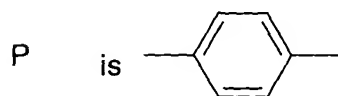
R - G - G - P - X (IIe)

R - G - P - G - X (IIf)

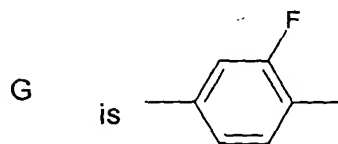
R - G - P - E - P - X (IIg)

in which

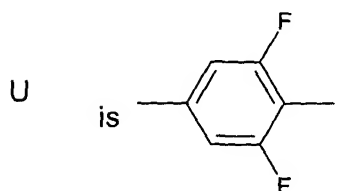
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E is -CH₂-CH₂-.

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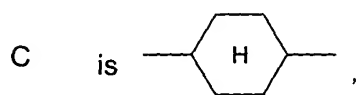
4. A liquid-crystalline medium according to one of Claims 1 to 3, wherein compounds of formulae (III) to (V) are selected from the

following compounds of formulae (IIIa) to (IIIf), (IVa) to (IVf) and (Va) to (Vd), respectively,

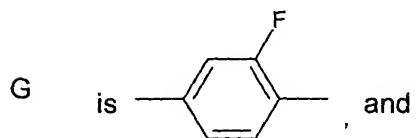
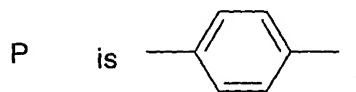
| | | |
|----|-----------------------|--------|
| 5 | R - C - P - G - X | (IIIa) |
| | R - C - P - U - X | (IIIb) |
| | R - C - C - G - X | (IIIc) |
| | R - C - C - U - X | (IIId) |
| | R - C - G - U - X | (IIIe) |
| | R - C - G - G - X | (IIIf) |
| 10 | | |
| | R - G - U - X | (IVa) |
| | R - G - G - X | (IVb) |
| | R - P - U - X | (IVc) |
| | R - C - P - X | (IVd) |
| | R - C - G - X | (IVe) |
| 15 | R - C - U - X | (IVf) |
| | | |
| | | |
| | | |
| | | |
| | | |
| 20 | R - C - C - P - U - X | (Va) |
| | R - C - P - G - U - X | (Vb) |
| | R - C - P - G - G - X | (Vc) |
| | R - C - C - G - U - X | (Vd) |
| | | |
| | | |

in which

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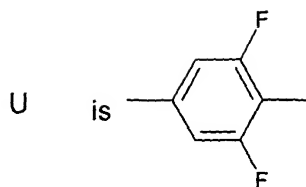


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5. A liquid-crystalline medium according to Claim 3 or 4, wherein, in the formulae (II) to (V),

10

R is an alkyl radical having from 1 to 7 carbon atoms, and

X is -F or -Cl.

15

6. A liquid-crystalline medium according to one of Claims 1 to 5, wherein the compounds of formulae (VI) and (VII) are selected from the following compounds of the (VIa) to (VIc) and (VIIa) to (VIIg), respectively,

20

R - P - Gl - Gl - F (VIa)

R - P - Gl - Gl - Cl (VIb)

R - P - G - P - R (VIc)

25

R - C - P - P - C - R (VIIa)

R - C - G - P - C - R (VIIb)

R - C - P - G - P - R (VIIc)

R - C - P - Gl - P - R (VIId)

R - C - G - P - P - R (VIIe)

R - C - Gl - P - P - R (VIIf)

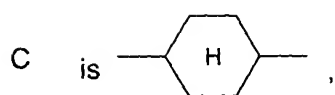
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R - C - Gl - P - C - R (VIIg)

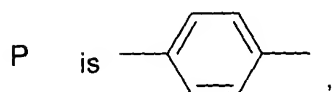
in which

R are each independent of one another,

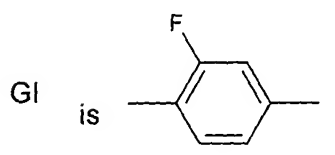
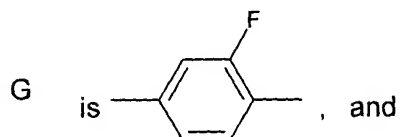
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15

7. A liquid-crystalline medium according to Claim 6, wherein R in the formulae (VI) and (VII) is an alkyl radical having from 1 to 7 carbon atoms.

20

8. A liquid-crystalline medium according to one of Claims 1 to 7, comprising

25

a) 1 to 50% by weight of one or more compounds of formula (I),

b) 5 to 90% by weight of one or more compounds of formulae (II) to (V),

c) 0 to 30% by weight of one or more compounds of formula (VI),

30

d) 0 to 20% by weight of one or more compounds of formula (VII),

e) 0 to 50% by weight of one or more compounds of formulae (VIII), (IX) and/or (X),

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where the sum of components a) to e) is 100% by weight.

9. A liquid-crystalline medium according to Claim 8, wherein component b) comprises,

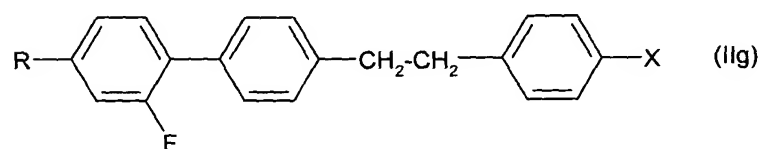
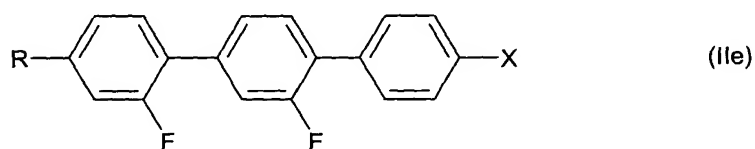
b1) 20 to 80% by weight of one or more compounds of formula (II), and

b2) 80 to 20% by weight of one or more compounds of formulae (III) to (V),

where the sum of components b1) and b2) is 100% by weight.

10. A liquid-crystalline medium according to one of Claims 1 to 9, comprising

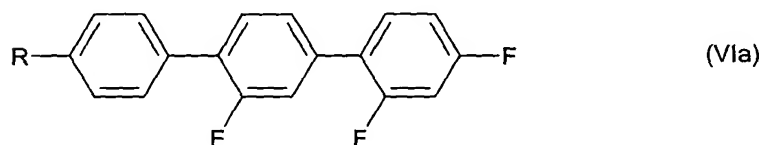
i) as compounds of formula (II), compounds of formulae (IIe) and/or (IIg)



in which

R is an alkyl radical having 1-7 carbon atoms, and X is Cl;

ii) as compounds of formula (VI), compounds of the formula (VIa)



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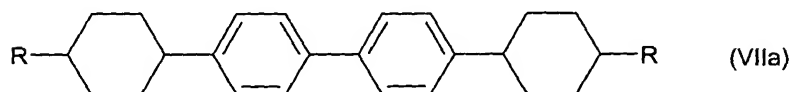
in which

R is an alkyl radical having 1-7 carbon atoms;

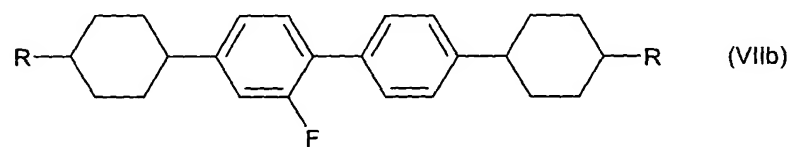
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- d) as compounds of formula (VII), compounds of formulae (VIIa) and/or (VIIb)

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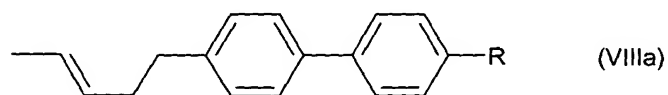
in which

R is an alkyl radical having 1-7 carbon atoms; and

20

- e) as compounds of formulae (VIII), (IX) and/or (X), one or more of the compounds of formulae (VIIa), (IXa), (IXb) and (Xa)

25



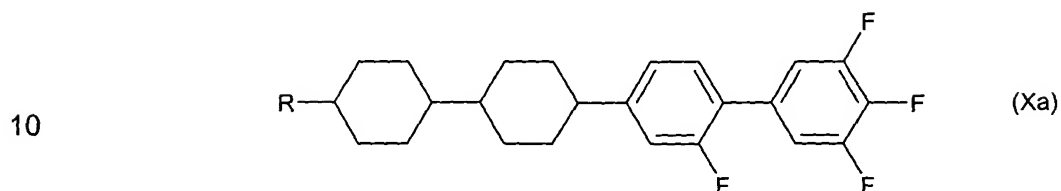
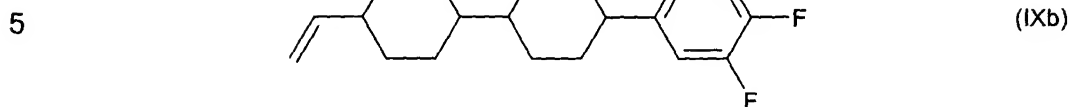
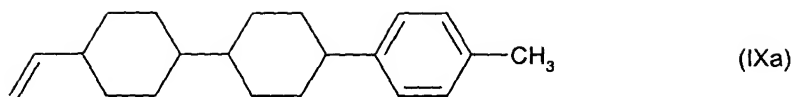
in which

R is an alkyl radical having from 1 to 7 carbon atoms,

30

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in which

15 R is an alkyl radical having 1-7 carbon atoms.

11. A liquid-crystalline medium according to Claim 10, consisting essentially of compounds of the formulae

- 20
- a) (I)
 - b) (IIe) and/or (IIg)
 - c) (VIa)
 - d) (VIIa) and/or (VIIb)
 - 25 e) (VIII), (IXa), (IXb) and/or (Xa).

12. A liquid-crystalline medium according to Claim 11, consisting essentially of:

- 30
- a) 1 - 50% by weight of one or more compounds of the formula (I),
 - b1) 5 - 50% by weight of one or more compounds of the formula (IIe),
 - b2) 5 - 50% by weight of one or more compounds of the formula (IIg),
 - 35 c) 0 - 30% by weight of one or more compounds of the formula (VIa),

- 5
- d) 0 - 20% by weight of one or more compounds of the formulae (VIIa) and/or (VIIb),
 - e1) 0 - 40% by weight of one or more compounds of the formula (VIIIa),
 - e2) 0 - 40% by weight of one or more compounds of the formulae (IXa) and/or (IXb), and
 - e3) 0 - 25% by weight of one or more compounds of the formula (Xa).
- 10
13. A liquid-crystalline medium according to Claim 12, consisting essentially of:
- 15
- a) 5 - 50% by weight of one or more compounds of the formula (I),
 - b1) 10 - 40% by weight of one or more compounds of the formula (IIe),
 - b2) 10 - 40% by weight of one or more compounds of the formula (IIg),
 - c) 2 - 20% by weight of one or more compounds of the formula (VIa),
 - d) 2 - 15% by weight of one or more compounds of the formulae (VIIa) and/or (VIIb),
 - e1) 5 - 20% by weight of one or more compounds of the formula (VIIIa),
 - e2) 5 - 30% by weight of one or more compounds of the formulae (IXa) and/or (IXb), and
 - e3) 2 - 20% by weight of one or more compounds of the formula (Xa).
- 20
- 25
- 30
14. In electro-optical display element containing a liquid-crystalline medium, the improvement wherein said medium is according to one of Claims 1 to 13.
- 35